CHM100 Chemical Safety Training

*Check Web Fileshare to make sure you have the most current version of CHM100 (*https://wfsprod01.sandia.gov/groups/srn-uscitizens/documents/document/wfs123456.pdf*).*

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Introduction

Welcome to Chemical Safety Training, CHM100. This training guides you through the requirements of the OSHA Hazard Communication Standard and Laboratory Standard, and allows for a simplified method of completing your site specific training.

This training applies to Members of the Workforce (employees and contractors) who acquire, use, store, produce, import or distribute chemicals at Sandia-controlled premises. The OSHA Standards, 29 CFR 1910. 1200 and 29 CFR 1910.1450, require that information and training be provided to employees to ensure they are apprised of the hazards of chemicals present in their work area. Employees must be informed of the measures they can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

Members of the Workforce must receive this training:

- At the time of their initial assignment to a work area where hazardous chemicals are present
- Prior to assignments involving new exposure situations

This training course consists of the following modules:

Module 1 – Introduction to Chemical Safety

Module 2 – The SNL Corporate Chemical Inventory System & MSDSs

Module 3 – Evaluation and Control of Chemical Hazards

Module 4 – SNL Emergency Procedures

Module 5 – Next Steps

How to get Credit

- Read through the course material.
- Answer all the practice questions, and check your answers.
- Successfully complete the end-of-course exam with a score of 100%. Return your completed exam to your Training Coordinator, who will forward it to the Course Manager for grading and entering into TEDs. You must successfully complete the final exam before receiving your site specific training. After you have successfully completed the CHM100 exam, take the **CHM103-**

Site-specific Chemical Safety Training Worksheet (form attached at the end of this document), to your Manager or Manager-designee to complete the second component of your training.

- The site specific training must be completed within 30 days of completing this course. Your Training Coordinator will then be responsible for entering your CHM103 completion into TEDS.

Course Objectives

After completion of each module, you will be able to:

Module 1

- Identify the regulatory drivers for handling and using hazardous chemicals
- Recognize Sandia's use of signs to communicate the hazards in your work area
- Recognize health and physical hazards of chemicals and the terms associated with them
- Identify the requirements of chemical labeling
- Identify methods used to detect hazardous chemicals
- Recognize signs and symptoms associated with exposure to hazardous chemicals

Module 2

- Identify and locate the list of the hazardous chemicals present in your SNL workplace using an identity that is referenced on the appropriate MSDS
- Identify and locate Material Safety Data Sheets (MSDSs) for the hazardous chemicals present in your SNL workplace
- Recognize the sections of the MSDS that are important for your safety whenever you work with a new chemical
- Correctly maintain the CIS when purchasing new chemicals

Module 3

- Identify and locate Sandia's Chemical Hygiene Plan and Hazard Communication Program
- Determine when information and training need to be provided if working with hazardous chemicals
- Identify the components of the Hazard Communication Program developed by Sandia
- Define an occupational exposure limit
- Recognize the additional protective measures that are required for handling particularly hazardous substances
- Identify the requirements for working with chemicals that are regulated under the OSHA expanded health standards
- Recognize that a Technical Work Document (TWD) is required when working with hazardous chemicals

- Identify the requirements that must be followed when chemicals are developed for another user outside of the Laboratory
- Locate the National Research Council's Prudent Practices in the Laboratory

Module 4

- Identify the SNL emergency number to call when you need help with a chemical spill
- Identify who to contact when you may have a reportable spill
- Identify the quantity of material that represents a reportable spill
- Identify and locate guidance on hazardous chemicals

Resources

ES&H Corporate Procedures

- ESH100.2.IH.4, Evaluate and Control Chemical Hazards
  https://my.sandia.gov/authsec/portal/cps/environmentalSafetyHealth/policy/process/procedure?procedure=ESH100.2.IH.4
- ESH100.2.ENV22, Manage Hazardous Waste at SNL
  https://my.sandia.gov/authsec/portal/cps/environmentalSafetyHealth/policy/process/procedure?procedure=ESH100.2.ENV.22
- ESH100.2.IH.20, Maintain an Accurate Chemical and Biological Material Inventory
  https://my.sandia.gov/authsec/portal/cps/environmentalSafetyHealth/policy/process/procedure?procedure=ESH100.2.IH.20
- ESH100.3.1, Prepare for and Manage Emergencies
  https://my.sandia.gov/authsec/portal/cps/environmentalSafetyHealth/policy/process/procedure?procedure=ESH100.3.1
- ES&H Glossary
  http://info.sandia.gov/policy/esh/esh-manuals/glossary/Glossary.html

Directives and Standards

- DOE Regulation 10 CFR 851
  http://www.hss.energy.gov/HealthSafety/WSHP/rule851/851final.html
- OSHA 1910.1200
  http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099
- OSHA 1910.1450
  http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10106

Contacts

- Division ES&H Teams
  http://info.sandia.gov/esh/liwg/Names_Numbers/custsupptop.htm
- IH Program
  https://oracleportalp.sandia.gov/portal/page/portal/Center_4100/4120_Home/4127_Home

Helpful Links and Websites

- NRC Prudent Practices in the Laboratory
  http://books.nap.edu/openbook.php?record_id=4911&utm_source=WID%13425326112009102 0163957&utm_medium=Widgetv3&utm_content=4911&utm_campaign=Widget&utm_term=h omeview
- Chemical Information System (CIS) (application)
  https://webprod.sandia.gov/CIS/svStartup
- MSDS Library
  https://webprod.sandia.gov/CIS/svMsdsOpenSearch
- Annual Report on Carcinogens (National Toxicology Program)
  http://ntp.niehs.nih.gov/index.cfm?objectid=32BA9724-F1F6-975E-7FCE50709CB4C932
- Occupational Health & Safety Administration (OSHA)
  http://www.osha.gov/index.html
- National Fire Protection Association (NFPA)
  http://www.nfpa.org/index.asp?cookie%5Ftest=1
- Expanded Health Standards List of OSHA Carcinogens
  http://www.osha.gov/SLTC/carcinogens/standards.html
- OOPS Reporting Process
  http://oops.sandia.gov/index.htm
- Site-Specific Chemical Safety Training Worksheet
  https://wfsprod01.sandia.gov/intradoc-cgi/idc_cgi_isapi.dll?IdcService=COLLECTION_GET_FILE&RevisionSelectionMethod=Latest&dDocName=WFS1048136

Module 1 Introduction to Chemical Safety

Upon completion of this module you will be able to:

- Identify the regulatory drivers for handling and using hazardous chemicals;
- Recognize Sandia's use of signs to communicate the hazards in your work area;
- Recognize health and physical hazards of chemicals and the terms associated with them;
- Identify the requirements of chemical labeling;
- Identify methods used to detect hazardous chemicals;
- Recognize signs and symptoms associated with exposure to hazardous chemicals.

The Occupational Safety and Health Administration (OSHA) requires employers to develop safety and health programs for employees who use hazardous materials in their workplace.

The two mandated OSHA Standards which are the regulatory drivers for these requirements are:

- 29 Code of Federal Regulation (CFR) 1910.1200, Hazard Communication (also known as the "Right to Know Law"), and
- 29 CFR 1910.1450, Occupational exposure to hazardous chemicals in laboratories (also known as the "Lab Standard")

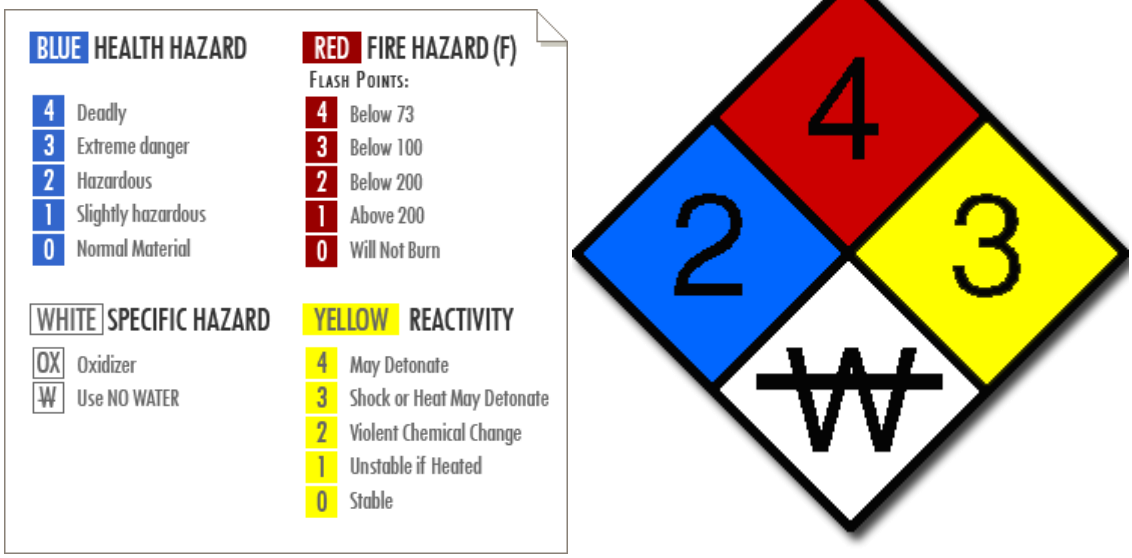
In addition, Department of Energy (DOE) 10 CFR 851, Worker Safety and Health Program identifies general requirements for worker safety and health that reduce or prevent occupational injuries, illnesses, and accidental losses by providing Members of the Workforce with a safe and healthful workplace. This standard mandates that work with hazards at all Sandia locations must comply with OSHA regulations and standards.

Corporate Procedure ESH100.2.IH.4, Evaluate and Control Chemical Hazards, complies with these requirements, and serves as the Sandia National Laboratories Chemical Hygiene Plan (CHP) and Hazard Communication Program (HCP). The Sandia CHP/HCP, is located in ILMS in the Environment Safety & Health (ES&H) Procedures section.

As a member of the Sandia Workforce you will be informed of hazards in your work area. When you begin working in a new area, be sure to read and understand all posted signs and placards. If you have questions, ask your manager for help.

SNL uses signage to inform Members of the Workforce of hazardous chemicals or other hazards in the work area. The Sandia Workplace Hazard Awareness System (SWHAS) is used at all Sandia sites except the CA site, where the Integrated Safety Management System (ISMS) Hazard Notice is used.

- Each SWHAS sign must include the owner of the area, their work location, their emergency contact phone numbers, and the National Fire Protection Association (NFPA) 704 Hazardous Materials Classification symbol.



The numbers/symbols should be derived from material safety data sheets (MSDSs) for most of the hazardous chemicals in the area.

For aid in determining the appropriate numerical rating and specific hazards, contact the appropriate SNL Division ES&H team member or the fire protection contact.

SNL/CA posts an ISMS Hazard Notice to effectively communicate the physical and health hazards that are present within a lab or work space, or are associated with a process or activity.

- The sign must indicate both the physical and health hazards of the location.
- The sign must indicate the necessary Personal Protective Equipment (PPE) or special precautions required for entry.

At all SNL locations some hazards have very specific regulatory sign requirements which require their own signage and may not be communicated on the SWHAS or ISMS Hazard Notice. Some of these hazards are radiation, lasers, and explosives. Refer to the ES&H procedures or the subject matter expert on your Division ES&H Team.

It's important for Members of the Sandia Workforce to understand the hazards that can be present when working with chemicals.

- Health hazards may cause measurable changes in the body, such as decreased lung function. The changes in the body are generally indicated by the occurrence of signs and symptoms such as shortness of breath.
    - Acute health effects usually occur rapidly as a result of short-term exposures such as asphyxiation from carbon monoxide.
    - Chronic effects generally occur as a result of long-term exposure and are of long duration. An example of a chronic effect is cancer.
- A physical hazard means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Hazard Terms

Certain terms are used in recognizing the hazards that chemicals can present. In your work at Sandia you need to know these terms so you are aware of the hazards of the chemicals we work with. The following terms are required by the OSHA Hazard Communication Standard to describe the health hazards of chemicals:

Carcinogens:

- A chemical is considered to be a carcinogen by OSHA if:
- It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or
- It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or
- It is regulated by OSHA as a carcinogen
- OSHA currently regulates and lists chemical substances as carcinogens or potential carcinogens in the OSHA regulation, 29 Code of Federal Regulations, 1910, Subpart Z. Some of these chemical substances that may be found at SNL are:
    - Asbestos
    - Benzidine
    - Benzene
    - Cadmium
    - Ethylene oxide
    - Formaldehyde
    - Inorganic arsenic
    - Methylenedianiline
    - Methylene Chloride
    - Vinyl chloride
    - 1,3-Butadiene

For a complete list of OSHA carcinogens and potential carcinogens visit the US Department of Labor OSHA Standards web page.

Corrosives:

A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.

- Examples of corrosives are acids and bases such as hydrofluoric acid or sodium hydroxide.

Irritants:

A chemical which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact.

- The site of contact may be the skin or the eyes.
- Aluminum oxide is an irritant commonly used at SNL.

Sensitizers:

A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

- Epoxies are an example of a sensitizer commonly used at SNL.

Toxic:

A chemical that is a toxin or “toxic” is likely to cause death or serious physical harm to the entire body or to an organ system in the body such as the nervous system.

- The toxic chemical may be absorbed either through ingestion, inhalation, or body (skin or eye) contact.
- An example would be arsenic.

Highly Toxic:

A chemical that has a lethal effect (causes death) at very low concentrations, either through ingestion, inhalation, or by body (skin or eye) contact.

- An example would be the nerve gas sarin.

Target Organ:

As defined in Casarett and Doull'e Toxicology, The Basic Science of Poisons, "Most chemicals that produce systemic toxicity do not cause a similar degree of toxicity in all organs but usually produce the major toxicity to one or two organs. These are referred to as target organs of toxicity for that chemical." The following is a target organ categorization of health effects which may occur, including examples of signs and symptoms and chemicals common at SNL which have been found to cause such effects.

Hepatotoxins: Chemicals which produce liver damage

- Signs & Symptoms: Jaundice; liver enlargement
- Chemicals: Carbon tetrachloride; methylenedianiline

Nephrotoxins: Chemicals which produce kidney damage

- Signs & Symptoms: Edema (swelling); protein in the urine
- Chemicals: Halogenated hydrocarbons; uranium

Neurotoxins: Chemicals which produce their primary toxic effects on the nervous system

- Signs & Symptoms: Narcosis; behavioral changes; decrease in motor functions
- Chemicals: Mercury; carbon disulfide

Agents which act on the blood or hemato-poietic system and deprive the body tissues of oxygen

- Signs & Symptoms: Cyanosis; loss of consciousness
- Chemicals: Carbon monoxide; hydrogen cyanide

Agents which damage the lung: Chemicals which irritate or damage lung tissue

- Signs & Symptoms: Cough; tightness in chest; shortness of breath
- Chemicals: Silica; asbestos, beryllium

Reproductive toxins:

Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)

- Signs & Symptoms: Birth defects; sterility
- Chemicals: Lead; cellusolve acetate (Glycol ether acetates)

Cutaneous hazards:

Chemicals which affect the dermal layer of the body

- Signs & Symptoms: Defatting of the skin; rashes; irritation
- Chemicals: Ketones; alcohols

Eye hazards:

Chemicals which affect the eye or visual capacity

- Signs & Symptoms: Conjunctivitis; corneal damage
- Chemicals: Organic solvents; acids

Ototoxic Chemicals:

Chemical substances identified by the American Conference of Governmental Industrial Hygienists (ACGIH) that have the potential to produce hearing loss or other adverse effects on organs or nerves involved in hearing or balance.

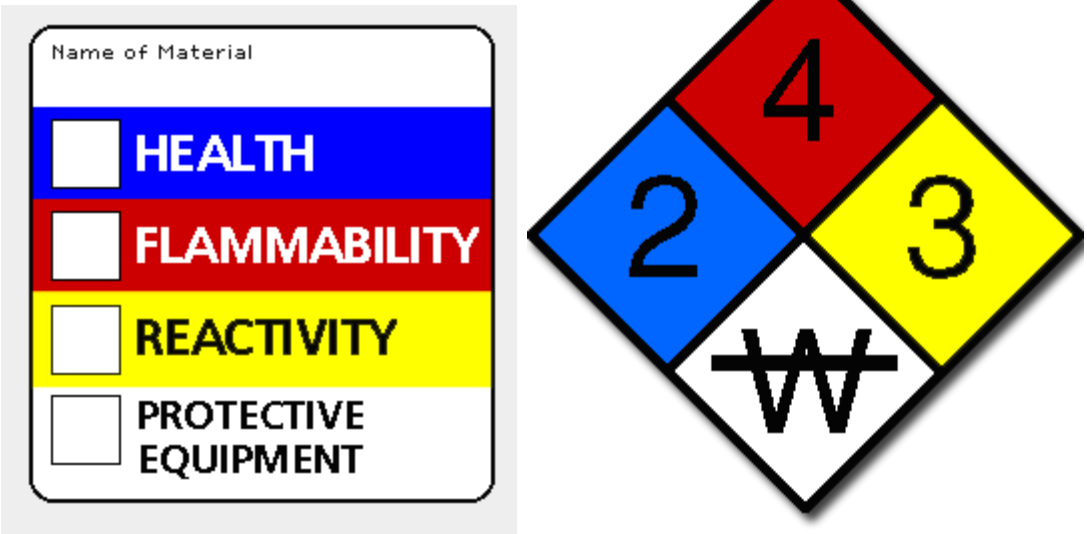
Labeling chemical containers is critical to safely working with them. When you work with chemicals, take time to read the label carefully before beginning your work.

- The warning label must include appropriate hazard warnings regarding the physical and health hazards of the chemical substance.
- The label must identify all hazardous chemicals in the container.

Labels are **not** required on portable containers into which hazardous chemicals are transferred from labeled containers, if the portable container is intended for immediate use by Members of the Workforce performing the transfer.

Unlabeled portable containers must never be left unattended.

- The manufacturer or distributor should include on the label the manufacturer's name, address, and emergency telephone number. Contact your Division ES&H Team if this information is not present on the label of a chemical substance.
- Warning labels may contain written warnings such as "carcinogen" or may use symbols or pictures such as the following:



Left: Hazardous Materials Identification System (HMIS) Labeling System
Right: National Fire Protection Association Diamond symbol (NFPA)

- The blue, red, and yellow colored areas indicate, respectively, the health, flammability, and reactivity hazard associated with the material. The white area is used to identify unusual hazards such as reactivity with water, or oxidizers.
- The blue, red, and yellow fields (health, flammability, and reactivity) all use a numbering scale ranging from 0 to 4. A value of zero means that the material poses essentially no hazard; a rating of four indicates extreme danger.
- Labels or other forms of warning must be legible, in English, and prominently displayed on the container. Information in other languages may be added as long as the information is presented in English as well.
- Any significant new information regarding the hazards of a chemical must be added to the label for the chemical within three months of becoming aware of the new information.
- Existing labels on incoming containers of hazardous chemicals must not be removed or defaced, unless the container is immediately marked with the required information.

Warning labels let the worker know what kinds of hazards are present. With a few exceptions, labels, tags, or warning markers are required on all containers of hazardous materials in the workplace, and on all containers being transported from one location to another.

The ability to detect the release or presence of hazardous chemicals is important to safely work with them. Methods that may be used to detect the presence or release of hazardous chemicals include:

- **Odor:** Some chemicals are vaporized into the air easily and emit a strong odor.

- Example: solvents such as isoamyl acetate, which smell like bananas
  NOTE: Odor is not necessarily directly related to the toxicity of a chemical.
- **Visual Appearance:** Release of some chemicals may be observed by the visible appearance of the chemical.
- **Air monitoring:** In areas where highly toxic substances are present, there may be air monitoring devices that alarm when the concentration of the substances reaches a certain value, such as 50% of the exposure limit.
    - Examples: arsine air monitors, oxygen monitors in liquid nitrogen areas.

Members of the SNL Workforce should be familiar with the physical and health hazards and the signs and symptoms of exposure associated with the chemicals they use.

- Signs and symptoms that could be related to chemical exposure are headache, drowsiness, coughing, jaundice, nausea, or a rash on contact with a chemical.
- Associated material safety data sheets (MSDSs) or other reference material should be reviewed for specific hazards.
- If you think you have been exposed to a chemical substance, contact your manager.

Module 1 Question(s):

1. Which of the following is true concerning warning labels?

a) With few exceptions, labels are not required on containers being transported from one location to another.
b) Labels may be removed from containers stored for less than one week.
c) Labels on containers being transported must contain at a minimum the name of the manufacturer.
d) With few exceptions, labels are required on all containers, both used in the workplace and those being transported.

2. What methods are used to detect the release or presence of hazardous chemicals?

a) Odor, visual appearance, and air monitoring
b) Odor, taste, and color
c) Air monitoring, housekeeping, odor

Module Answer Key:

1. d
2. a

Module 2 SNL Corporate Chemical Inventory System & MSDSs

Upon completion of this module you will be able to:

- Identify and locate the list of the hazardous chemicals present in your SNL workplace using an identity that is referenced on the appropriate MSDS;
- Identify and locate MSDSs for the hazardous chemicals present in your SNL workplace;
- Recognize the sections of the MSDS that are important for your safety whenever you work with a new chemical;
- Correctly maintain the CIS when purchasing new chemicals.

The Chemical Information System (CIS) is a web-based integrated chemical inventory and Material Safety Data Sheet (MSDS) document management system. The CIS project tracks the SNL chemical inventory through SNL-applied barcodes on individual chemical containers.

Information such as the chemical or product name, location, quantity, and information about who is responsible for the chemical is managed in the CIS database. The CIS is implemented for the New Mexico, California, and Nevada sites.

In addition to chemical inventory data, the CIS stores MSDSs for the tracked chemicals. The MSDS library in the CIS currently contains over 80,000 MSDSs. The MSDS Library is available on Sandia's Internal Web 24 hours a day, seven days a week. New MSDSs are continually added to the library for chemicals used on site and as requested. Access the CIS now from the Resources link and 'bookmark' it in your web browser.

The primary drivers for the CIS program are derived from state and federal regulations, among them the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Occupational Safety and Health Act (OSHA). These and other regulatory drivers determine the nature and type of chemicals tracked by the CIS program.

- The CIS fulfills the requirements of the OSHA Hazard Communication Standard of maintaining a list of the hazardous chemicals present in the workplace using an identity that is referenced on the appropriate MSDS.
- The CIS electronic inventory helps chemical users and their managers to assess and manage workplace hazards and is readily accessible.
- Hardcopies of MSDSs may be kept in the workplace as a backup source, but must be kept current with the workplace inventory and regulatory changes.
- The advantage of the CIS system is that it automatically updates MSDSs with current inventory and regulatory standards.

MSDSs are always available on the SNL internal web and you should consult them before working with any new chemical.

Quarterly backups are maintained by CIS staff and SNL's Emergency Operations Center in the event of a prolonged network outage. MOWs can call the CIS help line (SNL/CA: (925) 294-6737 and all other sites: (505) 844-6737) to obtain a copy of a MSDS during business hours. MOWs can call the EOC non-emergency helpline (SNL/CA: (925) 294-2300 and all other sites (505) 844-6515) to obtain MSDSs during non-business hours.

Contact your industrial hygienist if you have questions about MSDSs.

Per the OSHA Hazard Communication standard, the MSDS is required to cover 12 areas, but manufacturers and distributors may include as many as 16 sections.

- Section I contains the name of the chemical and similar chemicals with different names, the preparation or latest revision date and the manufacturer's name-address-phone number for emergencies.
- Section II contains the list of components in the chemical which are health or physical hazards and controls of the components, exposure limits such as the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) and OSHA Permissible Exposure Limits (PELs), the STELs (Short Term Exposure Limits), and ceiling exposure limits, if applicable.
- Section III is an emergency overview. It contains the potential health hazards, how the chemical enters the body, and the signs and symptoms of exposure to the chemical. Always check Section III when working with a new chemical.

The First Aid section of an MSDS describes the measures that may be taken when Members of the Workforce are exposed to a hazardous chemical.

Section V - Fire Issues

The Fire Fighting section of an MSDS describes the fire hazards of the chemical substance, such as the flammable limits.

The upper and lower flammable limits of a chemical substance indicate the likelihood that a chemical substance may ignite under the appropriate environmental conditions.

- Section VI covers containment of accidental spills and leaks, recommended personal protective equipment (PPE), and proper emergency response to a release of this particular chemical.
- Section VII covers safe handling and storage, and recommended storage conditions.

The Exposure Controls section of an MSDS describes the protective measures that can be taken to ensure that Members of the Workforce are not exposed to chemicals above published exposure limits.

- Section IX covers physical and chemical properties of the chemical substance such as the evaporation rate and the boiling point.
- Section X lists the incompatibilities of the chemical, its stability and reactivity, and its decomposition and hazardous by-products.
- Section XI contains the toxicological information on the chemical.
- Section XII contains the ecological effects information on the chemical.
- Sections XIII through XVI cover other regulatory requirements governing the proper disposal, shipping and any other state or federal regulations or information regarding the chemical.

Remember, the CIS satisfies the requirements of the OSHA Hazard Communication Standard by maintaining a list of the hazardous chemicals present in the workplace.

- At SNL/NM, chemical substances should be purchased through the SNL Just-in-Time (JIT) chemical supplier. The JIT system automatically affixes a tracking barcode label to the chemical container so that the chemical is immediately entered into the SNL inventory with an appropriate MSDS. If at any time a chemical container needs a barcode label, call the CIS/NM Helpline at 844-MSDS for barcoding service and other CIS related questions.
- At SNL/CA, the Hazardous Material Management team affixes a tracking barcode label to the chemical container in the on-site receiving process so that the chemical is promptly entered into the SNL inventory with an appropriate MSDS. If at any time a chemical container needs a barcode label, call the CIS/CA Helpline 294-MSDS for barcoding service and other CIS related questions.

Note: Refer to the requirements in ESH100.2.IH.20, Maintain an Accurate Chemical and Biological Material Inventory, when transferring or removing bar coded chemicals in the CIS inventory.

Before you work with hazardous chemicals at Sandia, you must complete this training followed by site-specific training from your manager.

During your site-specific chemical safety training, your manager is responsible for training you on the location and use of the SNL CIS and the MSDSs for your specific work area.

Module 2 Question(s):

1. What is the importance of the Chemical Information System (CIS)?

a) It tracks SNL's chemical inventory
b) It fulfills the requirements of the OSHA Hazard Communication Standard
c) Material Safety Data Sheets (MSDSs) are always up-to-date
d) All of the above

2. The MSDS lists health effects and safe exposure limits on chemicals found in the workplace. It also gives you information on which of the following?

a) How to create a chemical labeling system
b) What a chemical's main entry route into the body is
c) How to remove chemical stains from clothing
d) All of the above

Module Answer Key:

1. d
2. b

Module 3 Evaluation and Control of Chemical Hazards

Upon completion of this module you will be able to:

- Identify and locate Sandia's Chemical Hygiene Plan and Hazard Communication Program;
- Determine when information and training need to be provided if working with hazardous chemicals;
- Identify the components of the Hazard Communication Program developed by Sandia;
- Define an occupational exposure limit;
- Recognize the additional protective measures that are required for handling particularly hazardous substances;
- Identify the requirements for working with chemicals that are regulated under the OSHA expanded health standards;
- Recognize that a Technical Work Document (TWD) is required when working with hazardous chemicals;
- Identify the requirements that must be followed when chemicals are developed for another user outside of the Laboratory;
- Locate the National Research Council's Prudent Practices in the Laboratory.

SNL Hazard Communication Program and Chemical Hygiene Plan

The purpose of the Hazard Communication standard is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training. Employees must receive initial safety training about all hazardous chemicals in their work area at the time of their initial assignment, and additional training whenever new hazardous chemicals are introduced into the work area.

The Lab Standard has the same requirements as the Hazard Communication Standard for training, container labeling and Material Safety Data Sheets (MSDSs) but also includes these additional requirements:

- A written Chemical Hygiene Plan,
- Chemical exposures must be maintained below Occupational Exposure Limits (OELs),
- Respiratory protection must be provided to maintain chemical exposure below OELs,
- Medical consultations and/or examinations are provided if there is a suspected exposure, and
- Records for exposure monitoring results, employee medical evaluations, and employee training are maintained.

Corporate Procedure ESH100.2.IH.4, Evaluate and Control Chemical Hazards:

- Contains requirements for the safe handling, use, and storage of hazardous materials in laboratory, shop, and office settings;
- Describes how information concerning chemical hazards are communicated to Members of the Workforce;
- Identifies the location and availability of other reference material on the hazards and safe use of chemicals;
- Describes the responsibilities of Managers and Members of the Workforce;
- Serves as the SNL Hazard Communication Program (HCP), and the SNL Chemical Hygiene Plan (CHP);
- Applies to all Members of the Workforce who acquire, use, store, produce, import, or distribute chemicals at Sandia-controlled premises;
- Establishes worker "Right-to-Know" for chemicals in the workplace; and
- Provides requirements through which workers can protect themselves and others from chemical hazards.

Managers Role

Managers ensure:

- Activities under their jurisdiction are conducted in accordance with ESH100.2.IH.4, Evaluate and Control Chemical Hazards;
- All work is performed in accordance with ESH100.1.WPC.1 Plan and Control Work
- Proper acquisition, use, storage, and disposal of chemicals;
- Workers have access to material safety data sheets;
- Chemical inventories are maintained in accordance with ESH100.2.IH.20, Maintain an Accurate Chemical and Biological Material Inventory;
- Work areas where hazardous chemicals are used are properly placarded;
- An exposure assessment of potential chemical hazards (e.g., use of chemicals or chemical containing materials in the workplace) is performed;
- Any control measures specified as a result of the industrial hygiene exposure assessment are implemented and maintained;
- Workers are trained for each chemical hazard they will encounter;
- Workers are trained to recognize specific hazards (e.g., flammability, toxicity, reactivity, etc.) of the materials used in the work area; and

- Operations, procedures, or activities are reviewed and approved whenever a new chemical or change in process is introduced which creates a potential health hazard to Members of the Workforce.

Work Planning and Exposure Assessments

It is your manager's responsibility to ensure the potential chemical hazards in your work area are identified, evaluated and controlled in accordance with Sandia's Work Planning and Control Process. This is accomplished by contacting the Division ES&H Team Industrial Hygienist to perform an exposure assessment of potential chemical hazards (e.g., use of chemicals or chemical containing materials in the workplace).

During the exposure assessment, existing and potential workplace hazards are identified and assessed to evaluate worker health risks. In addition, control measures to prevent or abate hazards are also identified. Control measures include engineering controls, administrative controls, the use of personal protective equipment (PPE) and work practices.

Whenever changes in workplace conditions indicate a new or increased hazard exists, the Division ES&H Team Industrial Hygienist must be contacted to re-evaluate potential chemical hazards.

It is your responsibility to:

- Inform your manager of any potential workplace chemical hazards which have not been identified or assessed and
- Implement hazard controls, abatement measures, and interim protective measures to control chemical hazards.

Control Measures

Control measures include engineering controls, administrative controls, the use of personal protective equipment (PPE) and work practices. Control measures are selected based on the following hierarchy:

- Elimination or substitution of the hazards where feasible and appropriate;
- Engineering controls where feasible and appropriate;
- Work practices and administrative controls that limit worker exposures;
- Personal protective equipment.

Substitution and Minimization

Often the best way to protect yourself from exposure to a hazardous chemical is to use a less hazardous or non-hazardous chemical substitute. Select a chemical that has the desired chemical and physical properties and is less hazardous.

Make sure to purchase and use the smallest amount of chemicals you need. Don't stockpile. If possible, borrow chemicals from a colleague in your group. This reduces the volume of chemicals that you have on hand, and has the added benefit of reducing the amount of waste produced.

Engineering Controls

Engineering controls reduce or eliminate exposure to a chemical or physical hazard through the use of engineered machinery or equipment. Commonly used engineering controls include:

- Ventilation
- Chemical Fume Hoods
- Glove boxes
- Barriers and interlocks

Administrative Controls

Administrative controls are programs intended to limit the duration, frequency, and severity of exposure to hazardous chemicals or situations. Common administrative controls include:

- Operating procedures (e.g., TWDs);
- Labels and signs;
- Limiting worker exposure (e.g., worker rotation).

Technical Work Documents (TWDs)

Sandia uses Technical Work Documents (TWDs) like SOPs and OPs that describe safety and health considerations when work involves the use of hazardous chemicals. Your manager will tell you what TWDs are used in your work area during your site-specific training. Make sure you read and understand the TWDs used in your work area.

- TWDs describing safety and health considerations are developed and implemented consistent with the requirements specified in ESH100.2.GEN.3, Develop and Use Technical Work Documents.
- Chemical hazards and associated control measures, as identified by the exposure assessment, are incorporated into the TWD.

Personal Protective Equipment

The type of Personal Protective Equipment you will need depends on the potential routes of exposure for the chemicals you will be working with. There are four ways which chemicals can enter your body: inhalation, ingestion, absorption and injection. For our purposes, the injection route of entry includes not only an actual injury to the skin caused by a sharp, but also through a pre-existing injury to the skin or through a cut injury (injection) that breaks the skin during a procedure. The appropriate Division

ES&H Team member will perform a workplace hazard assessment for new activities to identify the required personal protective equipment (PPE) for areas or activities where workplace hazards exist.

Eye & Face Splash protection

To prevent chemicals from getting into eyes, goggles are the best choice. Safety glasses do not provide a seal around the eyes and can therefore allow droplets to fall into your eyes. Face shields are also an excellent choice for protecting the entire face from splash contamination. If you should also need eye protection from impact (such as from flying pieces of metal from a grinder or saw) or from radiation (such as from a laser), make sure the safety glass you choose are appropriate and rated for that type of eye protection.

Skin protection

In addition to the clothes and shoes we wear all the time, we need to wear additional protective clothing such as lab coats, lab aprons or chemical resistant protective suits and chemically resistant gloves to prevent contamination of our skin.

To prevent accidental ingestion of chemicals:

- Wear gloves during procedures involving chemicals.
- Wash your hands after each procedure.
- Never store food or beverages in the lab with chemicals.
- Never eat or drink in the lab.

Use of Respirators

- Where the use of respirators is necessary to maintain exposure below occupational exposure limits, SNL managers are responsible for providing the proper respiratory protection. The respirators shall be selected and used in accordance with the OSHA respiratory protection standard. Your Division ES&H Team Industrial Hygienist will evaluate potential airborne chemical hazards and identify the selection of the appropriate respiratory protection during the exposure assessment process.

Emergency Eyewashes and Showers

Suitable facilities (e.g., safety shower, plumbed/portable eyewash) for quick drenching or flushing of the eyes and body are required in work areas where Members of the Workforce may be exposed to injurious corrosive materials.

Eyewashes

- An emergency eyewash unit should be located in every laboratory and should deliver a gentle flow of clean, aerated water.

- When a chemical has splashed into the eye, irrigate the eye immediately.
- Flush the eye with a copious amount of water under gentle pressure.
- If the victim is wearing contact lenses, have him or her remove them at once if possible.
- Forcibly hold the eye open to wash thoroughly behind the eyelids.
- The victim must be given prompt medical attention regardless of the severity of the injury.
- Continue irrigating for 30 minutes before transport to a hospital or health center.

Safety Showers

- In case of chemical contact with the eyes or skin, immediately flush with water and DO NOT RUB the affected area.
- When flushing eyes, forcibly open the eyelids to ensure effective washing behind the eyelid.
- Wash face from the nose outward to the ear to avoid washing chemicals back into the eye or into an unaffected eye.
- Flood eyes and skin with water/eye solution for a minimum of 15 minutes.
- After or during flushing, remove contact lenses to rinse eyes of any harmful chemicals.
- Report any exposures or chemical contact to their managers immediately.
- Report to SNL Health Services for immediate medical attention after flushing eyes and body parts following an accident.

Occupational Exposure Limits

Managers are required to ensure that Members of the Workforce exposure to chemical substances regulated by OSHA does not exceed occupational exposure limits. An occupational exposure limit (OEL) is a generic term used to represent the concentration of a chemical that is allowable over a specific period of time such as an eight hour work day.

- SNL industrial hygienists monitor the concentration of chemicals in the air and compare the results to the OEL for the specific chemical. Some monitoring may be averaged over a 15 minute time period (a short term exposure limit) or an instantaneous exposure (a ceiling concentration). These concentrations usually are expressed as milligrams of chemical substance per cubic meter of air, or parts of chemical substance per million parts of air (ppm).
- Generally, OELs may be regulatory such as the Permissible Exposure Limits (PELs) promulgated by OSHA, or authoritative such as those published by non-regulatory organization such as the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).
- DOE Regulation 10 CFR 851 requires that Members of the Workforce exposure to hazardous substances is controlled such that they do not exceed the OSHA PELs or the ACGIH TLVs, whichever is more protective.
- At SNL, the occupational exposure limit for beryllium is regulated by the DOE Beryllium Standard (10CFR 850).

- Potential exposure to OSHA-regulated substances through eye and skin contact is prohibited.

Medical Consultation and Surveillance

Members of the Workforce are provided the opportunity to receive medical consultation if:

- They develop signs and symptoms associated with a possible exposure to a hazardous chemical; or
- An event (spill, leak, explosion, or other occurrence) in the work area results in the likelihood of a hazardous exposure.

Members of the Workforce are required to be enrolled in the appropriate medical surveillance program as determined by exposure monitoring for an activity performed by the industrial hygiene and documented in an exposure assessment.

OSHA Expanded Health Standards

DOE Regulation 10 CFR 851 requires that even when ACGIH TLVs are used as occupational exposure limits, SNL shall still comply with all of the provisions of any applicable OSHA-expanded health standard in Subpart Z of the OSHA regulation. These expanded standards are specific to chemicals such as:

- Asbestos
- Benzene
- Lead
- Methylene chloride

A list of the OSHA expanded health standards is included in the Resources link.

Hazards of nonroutine tasks

Your manager is responsible for informing you of the hazards of tasks that are non-routine, such as working on vessels (tanks) or pipes that may have unidentified health and physical hazards. This information shall be given during Site-Specific Chemical Safety Training (CHM103) at your work site.

The Laboratory Environment

Particularly Hazardous Substances

Members of the Workforce working with particularly hazardous substances in laboratories require additional protective measures. Particularly hazardous substances are select carcinogens, reproductive toxins, and substances which have a high degree of acute toxicity. Additional protective measures for these substances include:

- Signage designating the area where they are handled,

- Use of containment devices such as fume hoods or glove boxes,
- Procedures for the safe removal of contaminated waste, and
- Decontamination procedures.

Chemical Fume Hoods

If you are using any chemical in a way that could produce an airborne gas, vapor, mist, dust, or fume, the operation should be conducted in a fume hood or glove box. This will reduce or eliminate the risk of exposure by inhalation.

A fume hood is the primary containment device used to protect both personnel and the laboratory environment from hazardous chemicals. As a general rule, a fume hood should be used whenever a substance is appreciably volatile, or is recognized as a Particularly Hazardous Substance whose primary route of exposure is through inhalation.

The following rules should be adhered to when using chemical fume hoods.

- Do not put your head in the hood when hazardous vapors, fumes or airborne particulates may be present.
- Keep all apparatus at least 6 inches back from the face of the hood.
- Hoods are not to be used for storage. Store hazardous chemicals in an approved safety cabinet.
- Do not place electrical receptacles or other spark sources inside the hood when flammable liquids or gases are present.
- Keep the slots in the hood baffle free of obstruction by apparatus or containers.
- Keep sash at or below the maximum safe working height as indicated on the hood.
- Raise and lower the sash slowly to maintain effective airflow.
- Keep sash closed when not working in the hood.
- Minimize foot traffic past the face of the hood.
- Know what the indicators are for malfunctioning hoods:
    - No observed airflow going into hood
    - Airflow indicators show low airflow
    - Odors
- Stop work, close the sash, and notify your supervisor if a hood alarm sounds – DO NOT CONTINUE WORK.
- Keep laboratory room doors closed while working in a hood, unless instructed otherwise.
- Check that the "LEV Performance Test" sticker is current before performing work.
- Do not adjust the damper position on your hood without first consulting your Division ES&H Team Industrial Hygienist, as this affects the system operating parameters.
- Activities involving heating perchloric acid are only performed in specially designed fume hoods with water wash-down systems, which prevent the formation of shock-sensitive perchlorates.

Developing Hazardous Chemicals in the Laboratory

Your manager is responsible for ensuring that Members of the Workforce comply with the requirements of the OSHA Hazard Communication Standard when chemicals are developed for another user outside of the laboratory.

- These requirements include the preparation of MSDSs and labeling.
- Contact your manager and your ES&H Coordinator for assistance if a chemical is developed for another user outside of the laboratory.

Good Laboratory Practices

Members of the Workforce should follow good laboratory practices when working with hazardous chemicals. The National Research Council's (NRC) Prudent Practices in the Laboratory gives you some basics on personal protective equipment (PPE), local exhaust ventilation (LEV), and safe work practices. Access the NRC Prudent Practices in the Laboratory using the link above and bookmark it in your browser.

Safe Handling, Storage, and Disposal

To ensure safe handling of chemicals, read the labels and the operating procedures/technical work documents for your work area and make sure you understand them. Consult your manager if you are unsure of the hazards or the precautions to take with any of the chemicals in your work area.

- General practices for safe handling can be found in Section 7 of the MSDS, located in the SNL CIS. Specific practices for safe handling are in the operating procedures or technical work documents for your work area. These practices are meant to minimize your direct contact with the substance, reduce fire hazards or other reactions and prevent accidental release. Information such as "use only in a well ventilated area" will also be found in this section of the MSDS.
- General practices for measures you can take to protect yourself from hazardous chemicals may be found in Section 8 of the MSDS. Specific measures to control your exposure to hazardous chemicals will be covered in your site specific training and your organization's operating procedures/technical work documents. These measures may include work practices, emergency procedures, the use of local exhaust ventilation to control airborne exposure or personal protective equipment to protect against contact exposure.

Chemicals should be stored when not in use in order to minimize the risk to personnel and the environment. Incompatible materials shall be stored separately. Section 7 of the MSDS also indicates which conditions to avoid when storing chemicals, like excessive heat, direct sunlight or vibration.

- The requirements for storing flammable and combustible chemicals are found in ESH100.2.OTH.1, Manage Fire Protection Requirements.
- The requirements for the storage of gas cylinders are found in MN471000, Pressure Safety Manual.
- Chemical storage refrigerators are only used for storing chemicals (e.g., no storage of food or beverages).
- Refrigerators and freezers (e.g., explosion proof, laboratory safe) used for storing flammable liquids are designed and constructed by the manufacturer for that purpose.

During prolonged storage, a number of organic and inorganic chemical compounds used at SNL are capable of reacting with atmospheric oxygen to form peroxide compounds. As a general rule, the rate of peroxide formation is accelerated by exposure to light and heat, and the overall amount of peroxide increases with time. Many of these peroxides are highly flammable and may explode if exposed to heat, mechanical shock or light.

As purchased, most peroxide-forming compounds contain an inhibitor to prevent peroxide formation and as long as an adequate amount of inhibitor remains in the container, peroxide formation is not a problem. However, exposure to heat or light during prolonged storage may cause depletion of the inhibitor and lead to peroxide formation. Peroxide formers become more dangerous with age and must be tested to ensure peroxides have not formed above safe levels, as per requirements in ESH100.2.IH.4, Evaluate and Control Chemical Hazards. If they are not managed properly, expensive and time-consuming hazardous material response is needed. The MSDS will provide information on the peroxide-forming potential of chemicals in your work area.

The following storage and handling guidelines are recommended for peroxide-forming chemicals.

- Purchase only inhibited chemicals whenever possible.
- Limit quantities to the minimum amount that will be needed within the expiration period of the material.
- Review the Material Safety Data Sheet and/or contact your Division ES&H Team Industrial Hygienist for the chemical to determine proper handling and storage conditions for the material.
- Label all containers with the date the material was received, the date the container was opened, and the date the material was tested for peroxides.
- In general, peroxide forming chemicals should be stored in their original container. These containers should be air-tight and stored away from heat and light.

Peroxide-forming chemicals that show visible discoloration, crystallization or liquid stratification are to be treated as potentially explosive. Likewise, older steel containers that have visible rust are also to be treated as potentially explosive. If any of the above conditions are observed, line personnel shall not

move or open the container. Contact your Division ES&H Environmental Compliance Coordinator to arrange for an inspection and disposal of the container.

Never store chemicals in fume hoods as this practice interferes with the capture of chemical contaminants.

YES!

NO!

Members of the Workforce must ensure that they dispose of chemicals properly. Chemicals shall never be poured into sinks or allowed to evaporate as a means of disposal.

Note: Upon transfer or leaving Sandia employment, laboratory workers should arrange for the disposal or transfer of all chemicals for which they are responsible.

Module 3 Question(s):

1. New employees must receive training and information before working with hazardous chemicals. According to OSHA's Hazard Communication Standard, when would be another instance an employee would be required to receive information and training?

a) When a new manager is assigned to your department
b) A new physical or health hazard is introduced into the work area
c) Both of the above

2. Under the Hazard Communication standard, SNL must comply with all of the provisions of any applicable OSHA-expanded health standard in Subpart Z of the OSHA regulation. These expanded health standards are specific to which of the following chemicals?

a) Lead
b) Asbestos
c) Benzene
d) All of the above

3. One of the goals of the SNL Chemical Hygiene Plan is to:

a) Avoid the hazards of chemicals in the lab
b) Eliminate the need for emergency response
c) Protect employees from the health hazards of hazardous chemicals in their workplace
d) Prevent the release of airborne contaminants

Module Answer Key:

1. b
2. d
3. c

Module 4 SNL Emergency Procedures

Upon completion of this module you will be able to:

- Identify the SNL emergency number to call when you need help with a chemical spill;
- Identify who to contact when you may have a reportable spill;
- Identify the quantity of material that represents a reportable spill;
- Identify and locate guidance on hazardous chemical disposal.

Members of the Workforce are required to be trained in measures they can take to protect themselves from exposure to hazardous chemicals, including emergency procedures.

Generally at SNL, Members of the Workforce respond to what is called an "incidental release" or small spill. The term "incidental release" comes from the OSHA Hazardous Waste and Emergency Response (HAZWOPER) regulation which defines an incidental release as one in which "the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area."

- ESH100.3.1, Prepare for and Manage Emergencies describes the required and recommended actions to be taken by Members of the Workforce when an emergency condition is observed or experienced at SNL.
- Additionally, these types of events may need to be reported via the SNL OOPs reporting process.

SNL Non - Emergency Contacts

Members of the Workforce generating a small spill may clean it up unless they lack the training or equipment, or they do not feel comfortable.

Advice or assistance may be requested by contacting the SNL non-emergency hotline:

- At SNL/NM the number is 311, or 505-844-0311 (Outside Line)
- At SNL/CA the number is 311 or 925-294-2300 (Outside Line)
- At SNL/TTR the number is 295-8285
- At SNL/KTF the number is 335-5611

SNL Emergency Contacts

If human health or the environment is threatened during small spills, Members of the Workforce should call the **emergency number**.

- At SNL/NM the number is 911, or 505-844-0911 (Outside Line)
- At SNL/CA the number is 911 or 925-294-2222 (Outside Line)
- At SNL/TTR the number is 911

- At SNL/KTF the number is 335-5611 or 0

SNL Small Chemical Spill Cleanup

When Members of the Workforce determine that they will be responsible for small chemical spill clean-up in their work area, the following should be considered:

- Types or classes of chemical hazards that may be spilled; for example, corrosives, oxidizers, and solvents. The state of the chemical substance, solid or liquid, also should be considered.
- The potential health hazard and physical hazard of the chemical substance. Consult the MSDS or the Division Customer Support Team Industrial Hygienist if uncertain about the health or physical hazards.
- Types of spill control media that will be procured and used for the classes of chemicals present. Compatibility of the spill control media with classes of chemicals.
- Who will maintain a spill kit inventory.
- Procedures to be followed in the event of a spill such as evacuation or request for assistance.
- Personal protective equipment and hygiene practices.
- Immediate control measures that will be taken, such as:
    - turn off flammable or other energy sources,
    - turn on emergency ventilation,
    - use barrier materials,
    - barricade the laboratory or work area.

Required Emergency Equipment

All organizations with a potential for spills shall have the following appropriate equipment available:

- Personal protective equipment and
- Spill response equipment. (Spill response equipment may include sufficient and compatible absorbents and neutralizers, plastic buckets with lids, 6 mil plastic bags, trays or shovels, and brooms.)

Reporting Spills of Hazardous Materials

Personnel shall report small spills of hazardous materials as follows:

Reporting Small Spills

SNL Site	Spill Quantity	Report To
NM, TTR, KTF, CA	Less than one pound solid or one pint liquid	Manager

- Note that certain spills such as chemical substances on the extremely hazardous chemical list or that enter a drain are reportable, regardless of quantity.
- If uncertain about the reportability of a small spill, contact the Environmental Protection representative for your Division.
- Contact your manager for additional reporting requirements.

Personnel shall report large spills of hazardous materials as follows:

Reporting Large Spills

Greater than or equal to one pound solid or one pint liquid. Any gas leak.

SNL Site	Report To
NM	• Emergency: 911 (844-0911 for cellular phones) • Non-Emergency: 311 (844-0311 for cellular phones)
CA	• Emergency: 911 (294-2222 for cellular phones) • Non-emergency: 311 (294-2300 for cellular phones)
TTR	• Emergency: 911 • Non-Emergency: 295-8285
KTF	• Emergency: 335-5611 • Non-Emergency: 335-5611

- For non-emergency large spills follow the SNL OOPs reporting process.
- If human life or the environment is threatened, contact your emergency personnel and your Division Environmental Protection Representative. If you need assistance in reporting the spill, contact your Environmental Protection subject-matter expert (SME).
- Contact your manager for additional reporting requirements.

Handling of Chemical Waste

All spilled material, absorbents, neutralizers, and contaminated personal protective equipment shall be handled as chemical waste. Follow the requirements for containment, labeling, storage, and disposal request specified in ESH100.2.ENV.22, Manage Hazardous Waste at SNL, which may be accessed through the Resources link.

Additional Training

Personnel who routinely handle chemicals in their work activities and, therefore, may clean up a small spill, shall also be knowledgeable about the properties of the spilled material. Completion of this course and your site-specific training (CHM103) with your manager is required. Other required training may be necessary depending on the chemical hazards, including but not limited to:

- Appropriate respirator training
    - Air-Purifying Respirator Training (RSP215)
    - Comprehensive Respirator Protection (RSP217)
    - Protective Force Air-Purifying Respirator Protection (RSP215SPO)
- Beryllium Associated Workers Site-Specific Training (BEA101)
- Hazardous Waste & Environmental Management Training (ENV112) or Hazardous Waste & Environmental Management Training (CA) (ENV112CA);
- Biosafety in Microbiological and Biomedical Laboratories (BIO105 or Biosafety in Microbiological and Biomedical Laboratories at SNL/CA (BIO105CA) if biological hazards may be released with chemical substances.

Module 4 Question(s):

1. If human health or the environment is threatened during a small spill, you should immediately call:

a) SNL Non-Emergency Hotline
b) SNL Emergency number
c) ES&H Team Members
d) None of the above

2. Chemical spills that are less than one pound solid or one pint liquid are reported to:

a) Your Manager
b) The OSHA Representative in your area
c) SNL Emergency
d) None of the above

Module Answer Key:

1. b
2. a

Module 5 Next Steps

To complete your training you must:

- Print the site specific form for CHM103
- Successfully complete the CHM100 end-of-course exam

Once you have successfully completed the end-of-course exam, take the site specific form (CHM103) to your Manager. When you and your manager have completed your site specific training, send or take the form to your training coordinator.

If you are unable to pass the exam, you will need to retake the course before you can begin your site specific training. Study the objectives closely when you retake the course.

Below are the learning objectives that were covered in this course:

Module 1

- Identify the regulatory drivers for handling and using hazardous chemicals
- Recognize Sandia's use of signs to communicate the hazards in your work area
- Recognize health and physical hazards of chemicals and the terms associated with them
- Identify the requirements of chemical labeling
- Identify methods used to detect hazardous chemicals
- Recognize signs and symptoms associated with exposure to hazardous chemicals

Module 2

- Identify and locate the list of the hazardous chemicals present in your SNL workplace using an identity that is referenced on the appropriate MSDS
- Identify and locate Material Safety Data Sheets (MSDSs) for the hazardous chemicals present in your SNL workplace
- Recognize the sections of the MSDS that are important for your safety whenever you work with a new chemical
- Correctly maintain the CIS when purchasing new chemicals

Module 3

- Identify and locate Sandia's Chemical Hygiene Plan and Hazard Communication Program
- Determine when information and training need to be provided if working with hazardous chemicals
- Identify the components of the Hazard Communication Program developed by Sandia
- Define an occupational exposure limit

- Recognize the additional protective measures that are required for handling particularly hazardous substances
- Identify the requirements for working with chemicals that are regulated under the OSHA expanded health standards
- Recognize that a Technical Work Document (TWD) is required when working with hazardous chemicals
- Identify the requirements that must be followed when chemicals are developed for another user outside of the Laboratory
- Locate the National Research Council's Prudent Practices in the Laboratory

Module 4

- Identify the SNL emergency number to call when you need help with a chemical spill
- Identify who to contact when you may have a reportable spill
- Identify the quantity of material that represents a reportable spill
- Identify and locate guidance on hazardous chemical disposal

Module 5 Question(s):

1. After you complete this course, you must:

1. **Print CHM103 — Site-specific Chemical Safety Training Completion Worksheet.**
2. **Take the Worksheet to your Manager (or designee) who will review with you the site-specific activities for your job.**
3. **Ensure that the completed Worksheet is sent to your Training Coordinator, who will enter your CHM103 completion into TEDS.**

    a) True
    b) False

Module Answer Key:

1. a

CHM100 End-of-Course Exam

Name _____ Org. _____ SNL ID No._____

Project/Task _____ Date _____

Exam Instructions: Fax your completed End-of-Course Exam to the Course Manager at 284-2873 or mail to MS-0653 for grading and entering into TEDs.

1. What regulatory drivers apply to handling and using hazardous chemicals?

a) 29 Code of Federal Regulation (CFR) 1910.1200, Hazard Communication
b) 29 CFR1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories
c) 10 CFR 851, Worker Safety and Health Program
d) All of the above

2. What hazard is indicated by a NFPA warning label when it has a "0" in the red diamond?

a) This chemical has the lowest rating for reactivity.
b) This chemical has the lowest rating for a fire hazard.
c) This chemical has no specific hazard rating.
d) This chemical has the lowest health hazard rating.

3. Which of the following is generally considered a chronic effect of exposure to hazardous chemicals?

a) Cancer
b) Skin Irritation
c) Dizziness

4. Which of the following is true concerning warning labels?

a) With few exceptions, labels are not required on containers being transported from one location to another.
b) Labels may be removed from containers stored for less than one week.
c) Labels on containers being transported must contain at a minimum the name of the manufacturer.
d) With few exceptions, labels are required on all containers, both used in the workplace and those being transported.

5. The release of some chemicals may be observed by their visible appearance. What is another method that can be used to detect the presence or release of hazardous chemicals?

a) Air monitoring
b) Odor
c) Both of the above

6. A chemical that causes first degree burns to skin with only short-term exposure is:

a) An acute health hazard
b) A chronic health hazard

7. The Chemical Information System (CIS) contains:

a) A chemical's product name, location and quantity
b) Material Safety Data Sheets (MSDSs)
c) Responsible person for a chemical
d) All of the above

8. The MSDS lists health effects and safe exposure limits on chemicals found in the workplace. It also gives you information on which of the following?

a) How to create a chemical labeling system
b) What a chemical's main entry route into the body is
c) How to remove chemical stains from clothing
d) All of the above

9. Where would you look in the MSDS for clear advice about how to treat exposure to a hazardous chemical?

a) Composition information on Ingredients - Section 2
b) Hazards Identification - Section 3
c) First Aid Measures - Section 4
d) Accidental Release Measures - Section 6

10. When a new chemical is purchased, you must ensure:

a) The manufacturer is licensed to sell that particular chemical
b) A tracking barcode label is affixed to the chemical
c) To remove the chemical label and store correctly
d) All of the above

11. Employees who work with hazardous chemicals must be informed of which of the following?

a) SNL written Hazard Communication Program (HCP)
b) Chemical Information System (CIS)
c) MSDS Library
d) All of the above

12. Where can you find Sandia's written Hazard Communication Program (HCP)?

a) DOE Order 440.1A
b) OSHA's Hazard Communication Standard
c) SNL's ESH100.2.IH.4, Evaluate and Control Chemical Hazards
d) All of the above

13. Employees must be informed of the details of SNL's hazard communication program including components such as:

a) An explanation of the Sandia labeling system
b) An explanation of the Sandia MSDS system
c) Guidance to employees in obtaining and using the appropriate hazard information
d) All of the above

14. An Occupational Exposure Limit (OEL) is:

a) Arbitrary time that OSHA will allow workers to be exposed to a chemical before being transferred to another job
b) Maximum time a person can work with a chemical before taking a break
c) The concentration of a chemical that is allowable over a specific time period such as an 8-hour work day
d) Preferred experience level for new employees

15. Under the Hazard Communication standard, SNL must comply with all of the provisions of any applicable OSHA-expanded health standard in Subpart Z of the OSHA regulation. These expanded health standards are specific to which of the following chemicals?

a) Lead
b) Asbestos
c) Benzene
d) All of the above

16. For proper disposal of hazardous chemicals, you must:

a) Notify your Division ES&H Team after disposal
b) Allow to evaporate under an approved fume hood
c) Never pour into sinks or drains
d) All of the above

17. The Chemical Hygiene Plan will also include additional provisions for any work involving:

a) Select carcinogens, reproductive toxins or chemicals with a high degree of acute toxicity
b) Acetones, petroleum based chemicals, and radioactive chemicals
c) Chemical diluting, chemical distilling, or chemical disposal
d) Co-workers, supervisors, and temporary employees

18. Technical Work Documents (TWDs) are to inform employees of:

a) The safety and health considerations involving the use of hazardous chemicals in their work area
b) How to develop warning labels for hazardous chemicals
c) Both of the above

19. What requirement must be followed when chemicals are developed for another user outside of the laboratory?

a) A material safety data sheet (MSDS) must be prepared
b) The chemical must be properly labeled
c) Both requirements are mandatory

20. SNL has incorporated The National Research Council's Prudent Practices in the Laboratory to ensure:

a) Safe work practices are used when working with hazardous chemicals
b) Local exhaust ventilation (LEV) is used for operations which might result in release of toxic chemical vapors
c) Appropriate gloves and eye protection or other personal protective equipment are worn
d) All of the above

21. Where can you find your laboratory's safe handling procedures?

a) Your laboratory's technical work documents (TWDs)
b) OSHA Laboratory Standard 29 Code of Federal Regulations (CFR) 1910.1450
c) DOE Order 110.1A
d) None of the above

22. If human health or the environment is threatened during a small spill, you should immediately call:

a) SNL Non-Emergency Hotline
b) SNL Emergency number
c) ES&H Team Members
d) None of the above

23. Chemical spills that are less than one pound solid or one pint liquid are reported to:

a) Your Manager
b) The OSHA Representative in your area
c) SNL Emergency
d) None of the above

24. If human life or the environment is threatened by a large spill, who should be contacted?

a) DOE's OSHA representative and/or the Federal Bureau of Investigation (FBI)
b) SNL Emergency personnel, your manager, and your Division Environmental Protection Representative
c) Both of the above

25. Where can you find information on disposing of hazardous waste?

a) DOE Order 110.1A
b) OSHA Laboratory Standard 29 Code of Federal Regulations (CFR) 1910.1450
c) ESH100.2.ENV22, Manage Hazardous Waste at SNL
d) None of the above

CHM100 Feedback Form

Customer feedback is important to us. Please complete the evaluation form below and forward it to the Berta Armijo-Chavez, MS0653, and fax number: (505) 844-2748.

Rate on a scale of 1- 5 (with 1= poor and 5 =excellent):

- The ease of using of this learning tool and/or test? 1 2 3 4 5
- The organization of information presented? 1 2 3 4 5
- The amount of information presented? 1 2 3 4 5
- The usefulness of the information presented? 1 2 3 4 5
- Your level of knowledge related to this topic BEFORE using this learning tool and/or test? 1 2 3 4 5
- Your level of knowledge related to this topic AFTER using this learning tool and/or test? 1 2 3 4 5
- The overall quality of this learning tool and/or test? 1 2 3 4 5

Fill in the blanks:

- What was most valuable about this learning tool or test?

  _____
  _____
  _____
  _____

- What information needs to be corrected, inserted, removed, or updated?

  _____
  _____
  _____
  _____

- What could be done to improve or enhance this learning tool or test?

  _____
  _____
  _____
  _____

CHM 103 Site-specific Chemical Safety Training Completion Worksheet Instructions

CHM 103 is the final phase of your Chemical Safety training. In this phase, your manager is responsible for informing you about the site-specific chemical hazards in your work area.

You need to receive information and training regarding chemicals present in your work area as follows:

- At the time of your initial assignment
- Every 24 months thereafter
- Whenever a new physical hazard or health hazard is introduced into your work area, on which you have not previously been trained

Complete the following steps for course credit:

- Have your Manager (or designee) review the site-specific activities for your work with you
- Complete the attached site-specific training worksheet.
- Return the completed worksheet to your Training Coordinator. The Training Coordinator:
    - Enters completion of CHM103 into TEDS
    - Retains worksheet

CHM 103 – Site-specific Chemical Safety Training Worksheet

Trainee: _____ Org. Number: _____ Initials: _____

Space is provided below for the manager (or designee) to initial each of the CHM103 activities, signifying completion of the activity. When all activities are completed, have the Manager or designee sign and date, and forward to your Training Coordinator, who will enter the completion into TEDS and retain worksheet.

CHM103 Activity #1: Trainee has been informed of the operations and processes in their work activities that involve hazardous chemicals and the associated physical and health hazards.

Manager's initials:_____	Date:_____

CHM103 Activity #2: Trainee has been informed of the signage, postings, and labeling used to identify chemical hazards in his or her assigned work area(s).

Manager's initials:_____	Date:_____

CHM103 Activity #3: Trainee knows how to obtain written information about the hazards, signs and symptoms of exposure, exposure limits, safe handling, storage, and disposal of hazardous chemicals used in his or her work area.

Manager's initials:_____	Date:_____

CHM103 Activity #4: Trainee has been instructed in the methods used to protect them from chemical hazards in their work area, including proper work practices, personal protective equipment, engineering controls, and emergency procedures.

Manager's initials:_____	Date:_____

CHM103 Activity #5: Trainee has been trained in the methods and observations that may be used in their work area to detect the presence or release of a chemical (continuous air monitoring, alarms, odor or visual appearance, signs and symptoms of exposure).

Manager's initials:_____	Date:_____

CHM103 Activity #6: Trainee has been informed of the procedure(s) used by the manager to identify the chemical hazards of any non-routine tasks to which the trainee is assigned.

Manager's initials:_____	Date:_____

Manager's Signature (or designee):_____ Date completed: _____